Innovation in Adolescent Health Research:
Collaborating to Study Multiple Risk and Protective Factors
Thursday, September 1, 2005
9:30 a.m. to 11:30 a.m.
Koger Center, Rhodes Building, Room 4000

Summary

The challenges and potential opportunities from the study of multiple risk and protective factors of adolescent health were discussed at this forum hosted jointly by the Prevention Research Centers Program (PRC), Centers for Disease Control and Prevention (CDC), and Academic Centers of Excellence on Youth Violence Prevention (ACE).

Janet Collins, Ph.D., director of CDC's National Center for Chronic Disease Prevention and Health Promotion, gave opening remarks and **Ileana Arias, Ph.D**., director of CDC's National Center for Injury Prevention and Control, closed the session. A panel discussion moderated by **Adele Franks, M.D.,** medical epidemiologist for PRC, covered three main topics concerning the adolescent health agenda, including the research progress around multiple risk and protective factors, the areas that need to be explored, and ways to advance the field. **Marc Elliot, Ph.D.,** a statistician for the PRC at UCLA, spoke about methodological issues.

The goal was to generate ideas for a research agenda that takes into account:

1) The multiple interrelated risk and protective factors that influence adolescents' behavior and affect their health.
2) The methodological and analytic challenges raised by these interrelated factors.

Panelists:

Cleo Caldwell, Ph.D., PRC, University of Michigan
Nancy Guerra, Ed.D., ACE, University of California at Riverside
Kimberly Horn, M.A., M.Sc., Maps, Ed.D., PRC, West Virginia University
Michael Resnick, Ph.D., PRC, University of Minnesota
Mark Schuster, M.D., Ph.D., PRC, UCLA/RAND
Michael Windle, Ph.D., ACE, University of Alabama at Birmingham

Discussants:

Geri Dino, Ph.D., PRC, West Virginia University
Philip Leaf, Ph.D., ACE, Johns Hopkins University
Freya Sonenstein, Ph.D., PRC, Johns Hopkins University

PART ONE: Panel Observations and Recommendations:

In the field of adolescent health, how is the challenge of multiple interacting risk and protective factors handled, and what have we learned so far about how these multiple factors interact?

- Current theories to understand multiple dynamic influences include ecological theory, systems theory, and the theory of triadic influences.

- Qualitatively, researchers are using ethnographies, videos, and personal diaries to understand risk and protection around certain behaviors. Quantitatively, investigators are trying to sort out the influence of different contexts; including family systems, peer networks, schools, and neighborhoods.

- Communication across investigative teams and the use of replication studies has increased, both within the United States and internationally.

- Federal funding is increasing for community-based participatory research.

- New research is looking at spiritual connectedness in the lives of adolescents, following research on the role of connectedness to people and institutions.

- Researchers have learned that multiple risk factors lead to poor outcomes, through multiple pathways. The number of exposures makes a difference.

- Mental health has emerged as one of the most powerful risk factors. Inadequate mental health may be a limiting factor in the effectiveness of current interventions.

- Research is conducted in "silos." Researchers studying related topics do not communicate, and some resist expanding a study beyond their primary fields.

What remains to be learned about multiple risk and protective factors and their interaction?

- Much is unknown about changing risks and protective factors over time. Influences on adolescent behavior are dynamic and multilevel, but many studies are cross-sectional.
    - Not enough is known about early adolescence.
    - Adolescence should be studied as a developmental stage.
    - Research should address early childhood exposures such as maltreatment or poor parenting practices and their relation to adolescent health.
    - Life course epidemiology could be a new resource for interventions and studies using the life stages model.

    - The same factors are not necessarily most significant at different ages for a given behavior. Variations and interactions by gender, race, ethnicity, or socioeconomic status are unknown.
    - Studies should examine whether positive or negative social contacts cluster and change over time.
    - Long-term studies should consider the different interactions required between the researchers and an organization over time, as well as with individuals.

- Current models do not capture the complexity of the real world.
    - Studies do not look at the full array and level of behaviors, or do not look at multiple behaviors in a thorough manner and across time.
    - Studies do not measure the amount of variance around a risk factor.
    - Studies need to collect data from multiple sources, including peers, families, community, media, and schools.
    - Isolating the most critical risk factors is difficult.
    - Sometimes a risk factor or intervention is not applicable across a range of health behaviors or at all levels of a behavior.
    - Analytical models are sophisticated and hard to explain, but communities and schools want simple answers and interventions.

- Studies tend to look at external behaviors such as substance use, sex, and violence, but not at internal aspects such as anxiety, depression, and withdrawal.

- Not enough is known about protective factors.

- The reason for and function of negative behavior needs to be better understood.

- People in adolescent health research do not take advantage of knowledge and resources outside of public health, such as data from the No Child Left Behind program.

- Knowledge of how ethnic identity operates as a risk or protective factor is needed.

- The juvenile justice arena could be explored more for public health interventions.

- Researchers lack a common language for adolescent health, making comparison of studies difficult.

If we are going to become better equipped over the next decade to have a desirable effect on adolescent behavior, what kinds of research do we need to do to advance our understanding of multiple interrelated risk and protective factors, and how can we work together to make this happen?

- The recommended research has several characteristics:
    - Starts with funders who understand the complexity of youth health studies.

- Gathers inputs from many sources during design phase.
- Is designed with dissemination and generalizability in mind.
- Brings together researchers from different disciplines.
- Includes multiple risk and resilience factors and multiple behaviors.
- Is tailored for gender, socioeconomic status, race, and ethnicity.
- Recognizes influences of contexts such as family, school, and community.
- Gathers data from multiple sources including parents and teachers.
- Is duplicated in different geographical locations or with different groups.
- Uses qualitative and quantitative methods.
- Listens to youth and builds on youth assets.
- Emphasizes developmental needs of adolescents.
- Starts with children and continues long-term, with adequate funding.

- Interventions should have the following characteristics:
  - Examine more than one type of problem within an intervention context.
  - Look at multiple types of approaches to solving problems.
  - Be conducted in multiple settings including the media, parenting programs, schools, and community groups.
  - Be tailored for gender, socioeconomic status, race, and ethnicity.
  - Be evaluated multiple times.
  - Look at unexpected effects including detrimental effects.

- New ideas are needed to make this research happen:
  - Create a set of guiding principles for adolescent health that includes measurement methods and standard definitions for commonly used words.
  - Break down artificial boundaries that limit the ability of researchers to work together.
  - Counteract the lack of political will and lack of resources to address the pervasiveness of violence in the lives of children and youths as a public health problem.
  - Incorporate measures of protective factors into routine surveillance systems and other data sets, including non-health-oriented government surveys.
  - Commit more money and time for follow-up and longitudinal studies because:
    - Interventions with booster sessions are more efficient than inoculation models.
    - Long-term funding ensures that trust increases between researchers and communities and can be sustained over time.

  - Implement mechanisms to help communities sustain interventions without researchers.
  - Increase reliance on communities to define and support solutions and communication methods.
  - Integrate qualitative and quantitative methods within studies.

- Provide timely information to the public about positive behaviors that are identified in research studies and ways to change negative behaviors.
- Train the next generation of researchers to be involved in the community.
- Do not give up on programs that do not work immediately.
- Work with nontraditional partners, such as companies, behavior experts, transportation experts, or urban planners in designing studies.
- Make use of infrastructure that currently exists, such as the Prevention Research Centers.

PART TWO: Marc Elliot speech on statistical methods

What is the state-of-the-art in methodology for addressing multiple risk factors and their interactive effects?

- **Design:**
  - Complex, multistage, multipurpose designs that minimize bias are available.
  - Well-controlled studies of meaningful samples within a community are possible.
  - Statistical power for complex interactions is carefully selected.

- **Measurement**:
  - Sophisticated psychometrics are a standard.
  - Biases are minimized, whether cognitive bias; response bias; social desirability bias; bias driven by memory, primacy, recency, visual vs. auditory differences.
  - Adjustment is used after data collection.
  - Item response theory allows more efficient scoring and detection of differential measurement for different subgroups.
  - Attention is given to efficiency—to get the most information possible out of sample size and budget.

- **Analysis**:
  - Broad use of complex covariant structure.
  - Structural equation modeling is used to deal with covariance across different measures.
  - Hierarchal linear models are used for covariance across different levels.
  - Spatial and time series models are used to focus on correlations over time and space.
  - Access has increased to software packages that deal with complex survey data.
  - Advances made in “closed testing,” a more efficient way of dealing with multiple testing.
  - False discovery rate gives a realistic perspective on what percentage of findings are real.

- Multiple mutation is widely used to deal with non-response or missing data.

- **Interpretation and communication**:
  - Variance component analysis, parallel models, and scaling are used to assess relative importance of factors
  - Magnitudes and units, not significance tests, are used for practical interpretation

- **What are the new areas of exploration and areas that need more focus?**
  - Using simulation to help find the optimal research design.
  - How to prevent stratified random assignments.
  - How to use propensity scores.
  - How to incorporate measurement error and unreliability directly into analyses.
  - Addressing the tradeoff between better measurement and bigger sample.
  - Research on how mode of administration affects responses.
  - Using new causal models.
  - Looking at distributional effects other than shifts in mean and location.
  - Using small-area estimation.
  - Understanding how participation is directly related to outcome.
  - Research on translation.

- **Related points made by audience and speaker:**

  - Researchers would benefit from a simple guidebook about the state-of-the-art methods so that they could explain to communities the types of questions that can be answered.
  - CDC should invest directly in methodology research.
  - Propensity scores can control for a naturally occurring change point and show how robust an intervention is.
  - Obtaining data for multiple risk factors means lengthy questionnaires, and respondent burden can affect measurement and design.
  - Investigators should involve statisticians in projects from conceptualization.